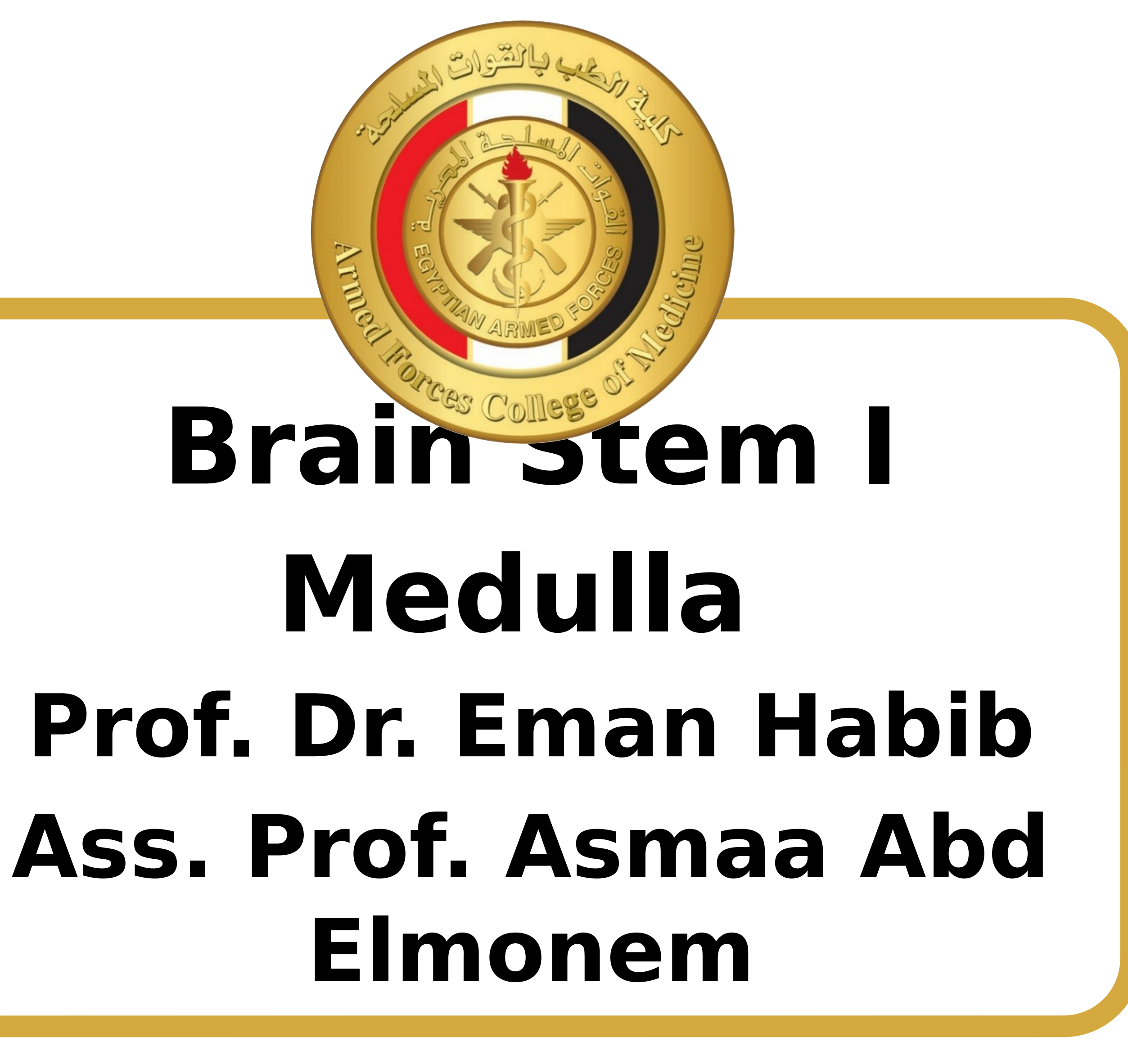


Armed Forces College of Medicine

AFCM



Brain Stem I
Medulla

Prof. Dr. Eman Habib
Ass. Prof. Asmaa Abd Elmonem

INTENDED LEARNING OBJECTIVES (ILO)



By the end of this lecture the student will be able to:

1. **Describe gross morphology of ventral and dorsal aspects of MEDULLA OBLONGATA**
2. **Describe the internal structure and correlated functions of the different levels of medulla.**
3. **Describe superficial attachments of cranial nerves.**
4. **Describe blood supply of medulla .**
5. **Correlate the vascular distribution with the**

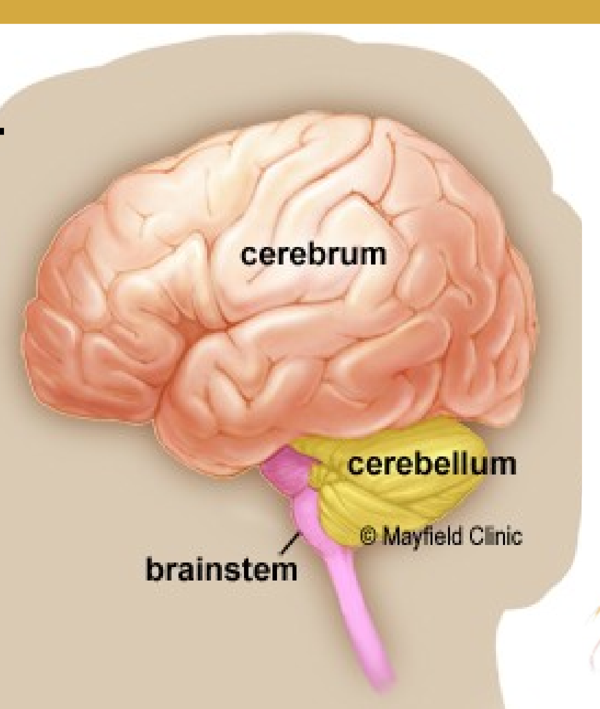
BRAIN STEM

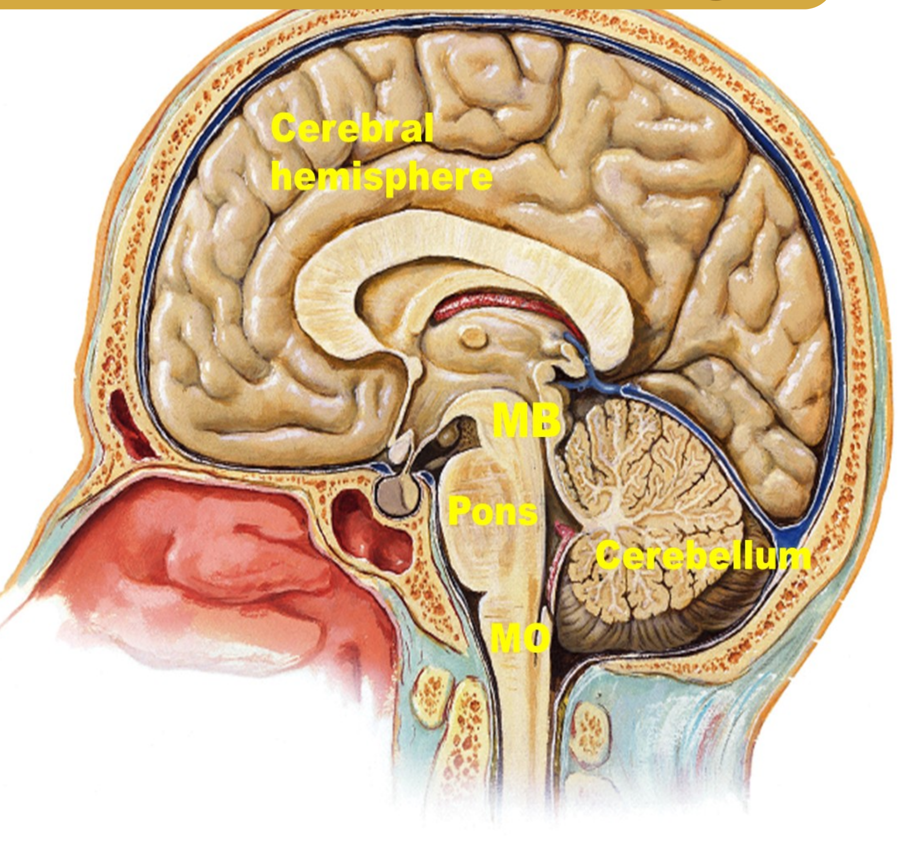


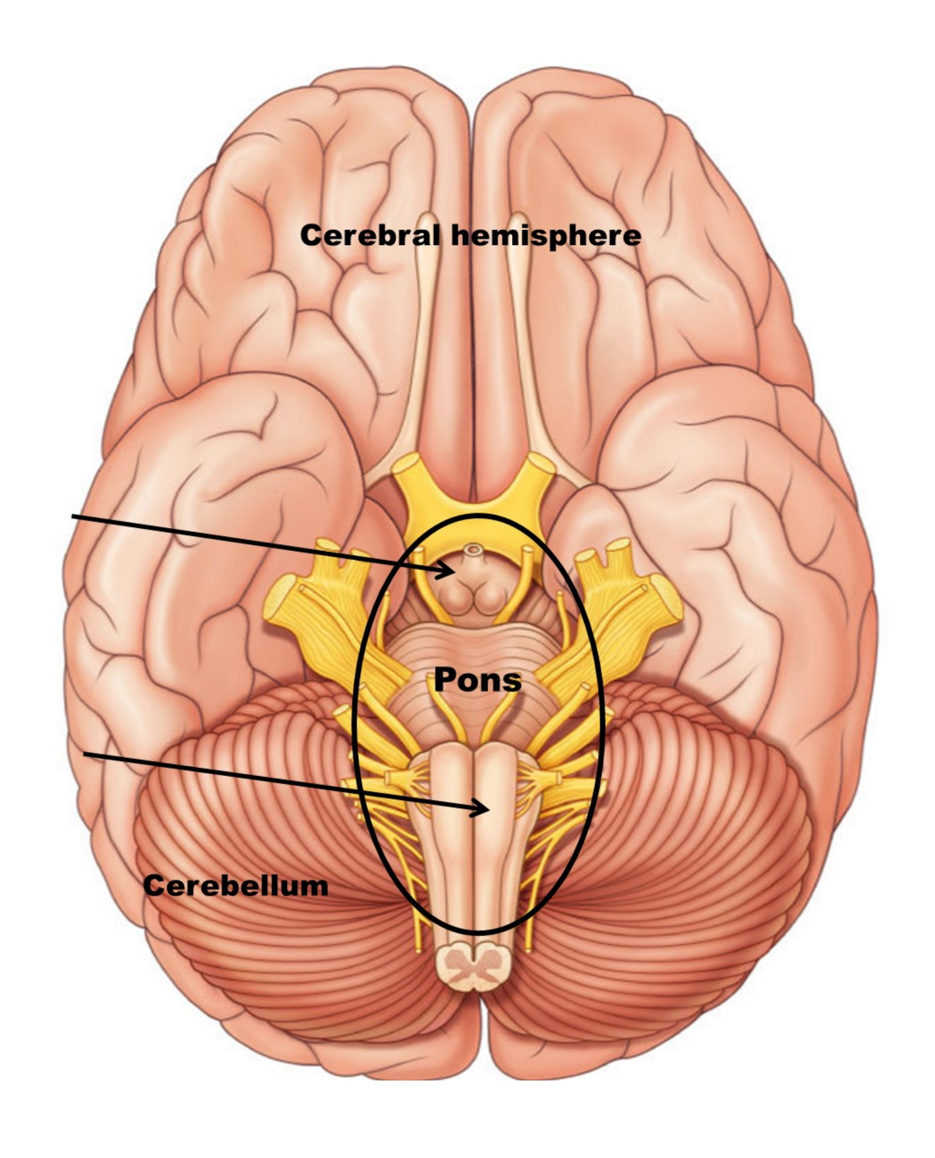
The brain stem is formed of:

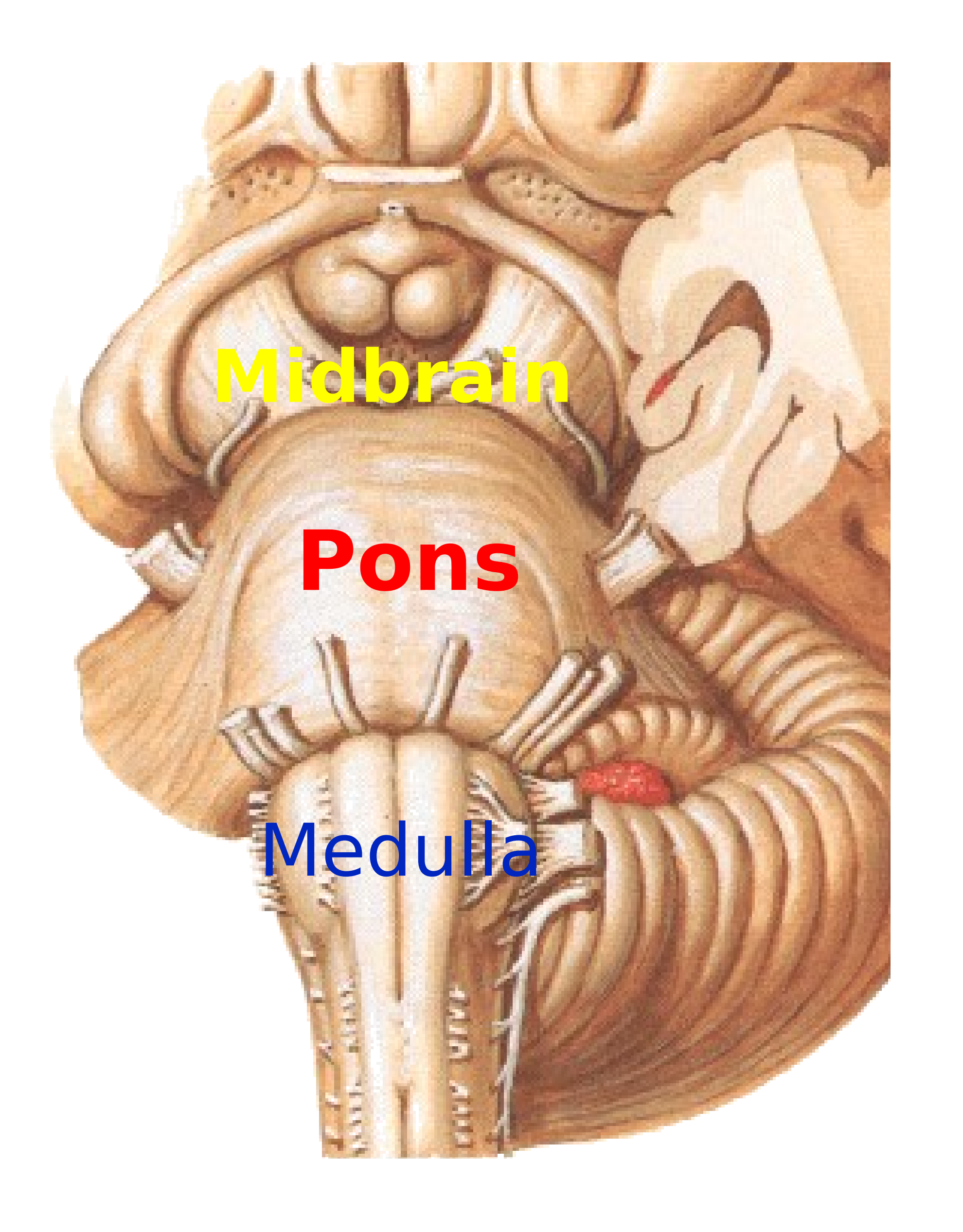
I. midbrain
II. Pons
III. medulla oblongata.

It connects the Cerebral Hemispheres with the



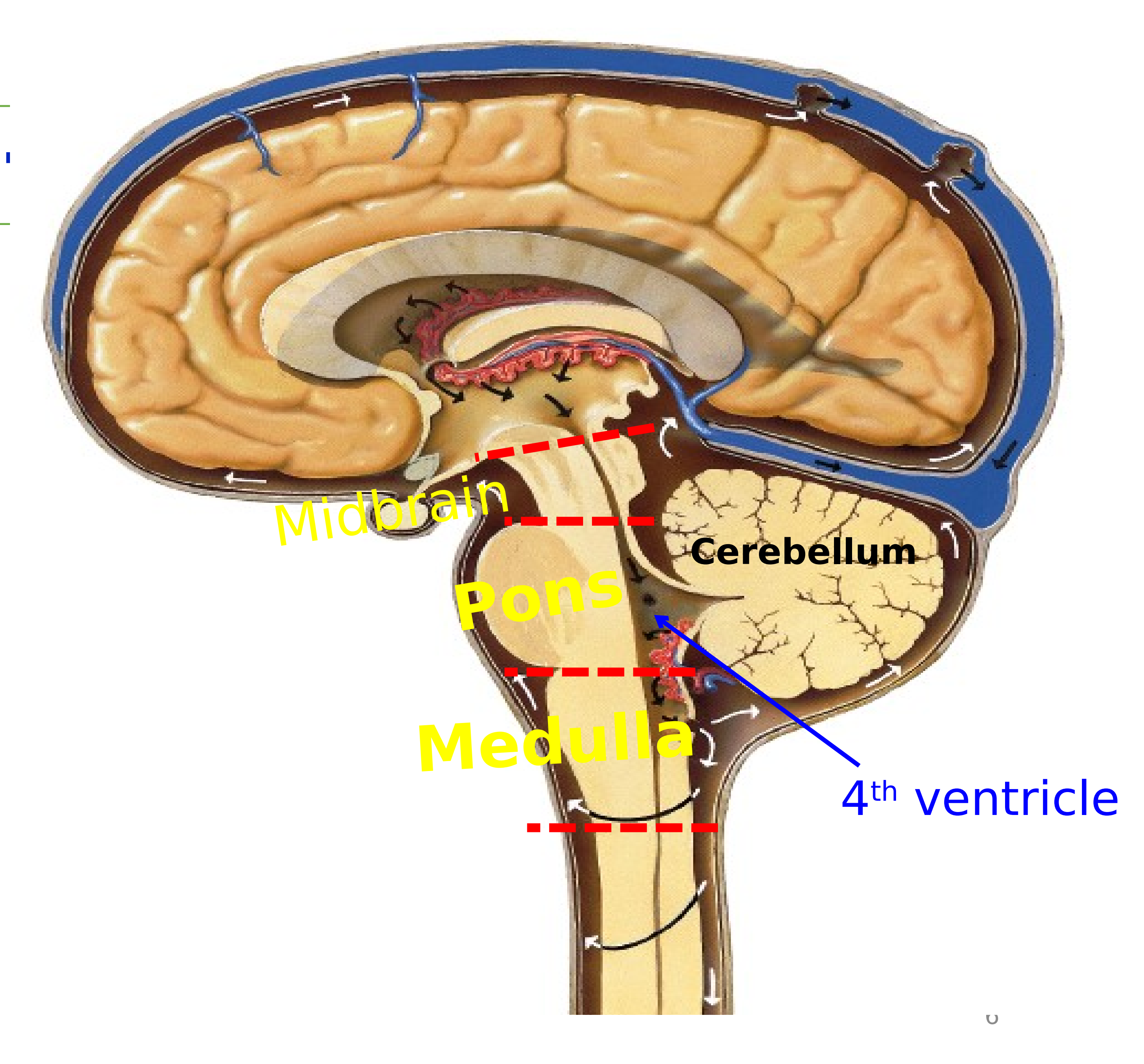



Cerebral hemisphere
Pons
Cerebellum


Midbrain
Pons
Medulla

Medulla oblongata

EXTENSION:
from the lower border of the foramen magnum below
to the lower border of the pons above

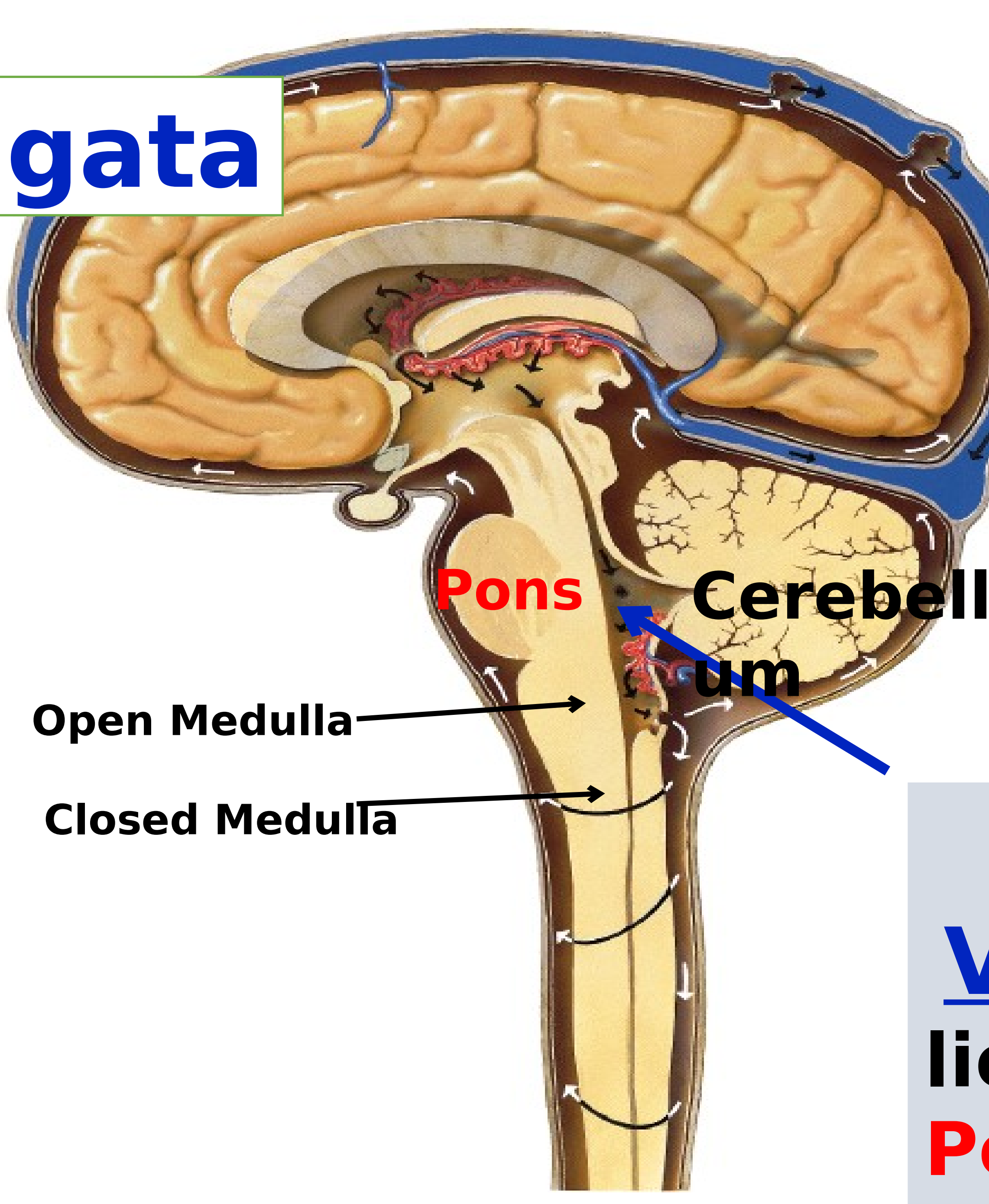


dulla oblongata

1) Open Medulla:

***Is the upper part.**

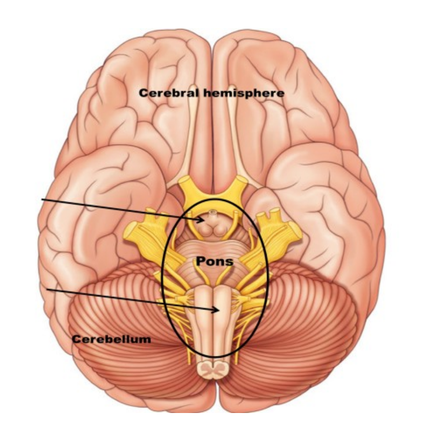
***Opposite the 4th ventricle (forms the lower part of its floor)**



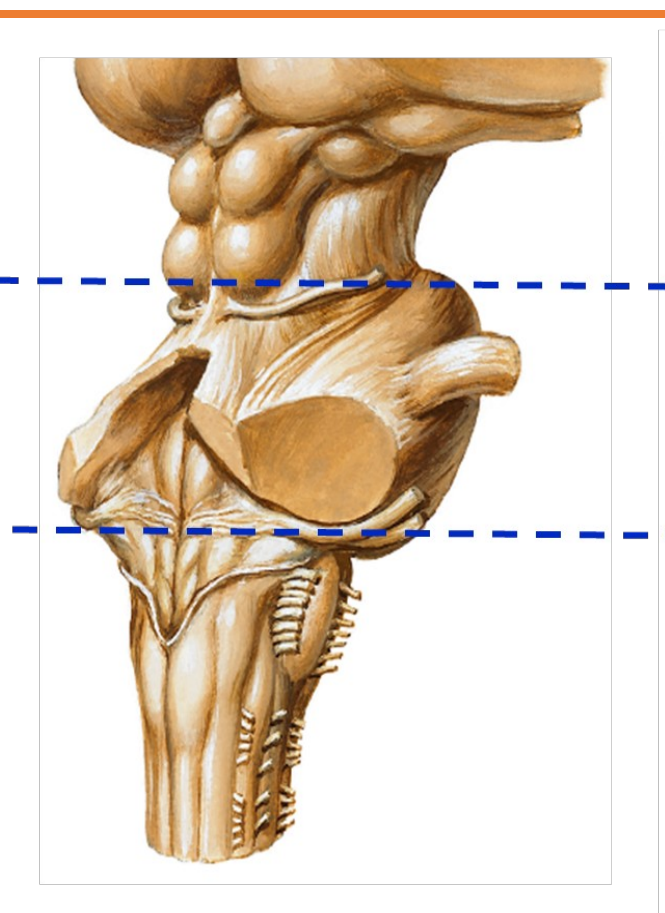
4TH VENTRICLE

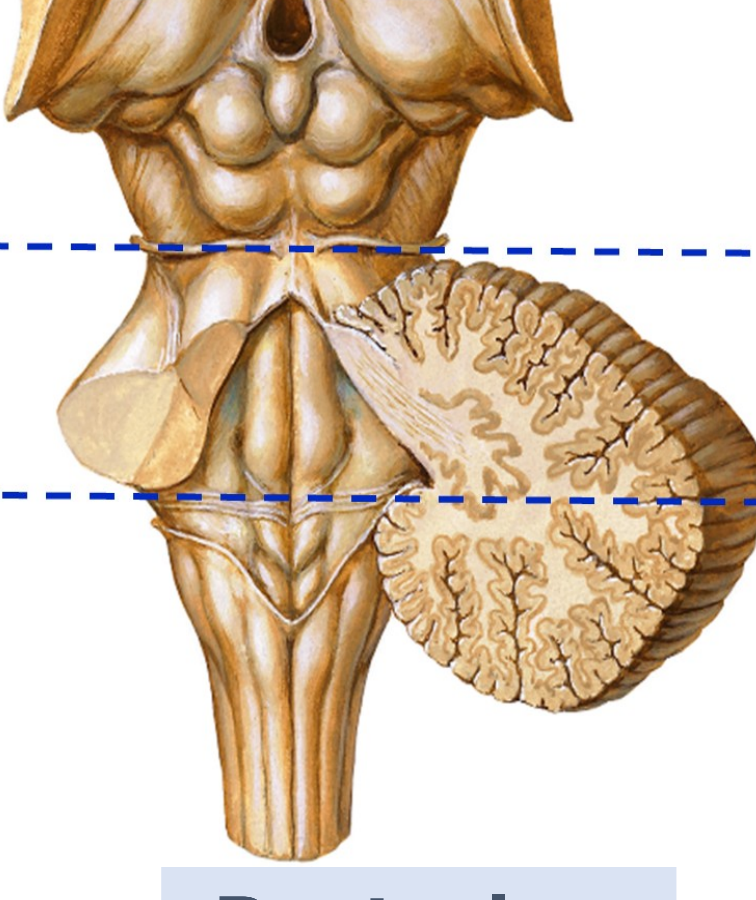
lies inbetween Pons & Medulla

SURFACES OF BRAIN STEM



- Midbrain
- Pons
- Medulla Oblongata



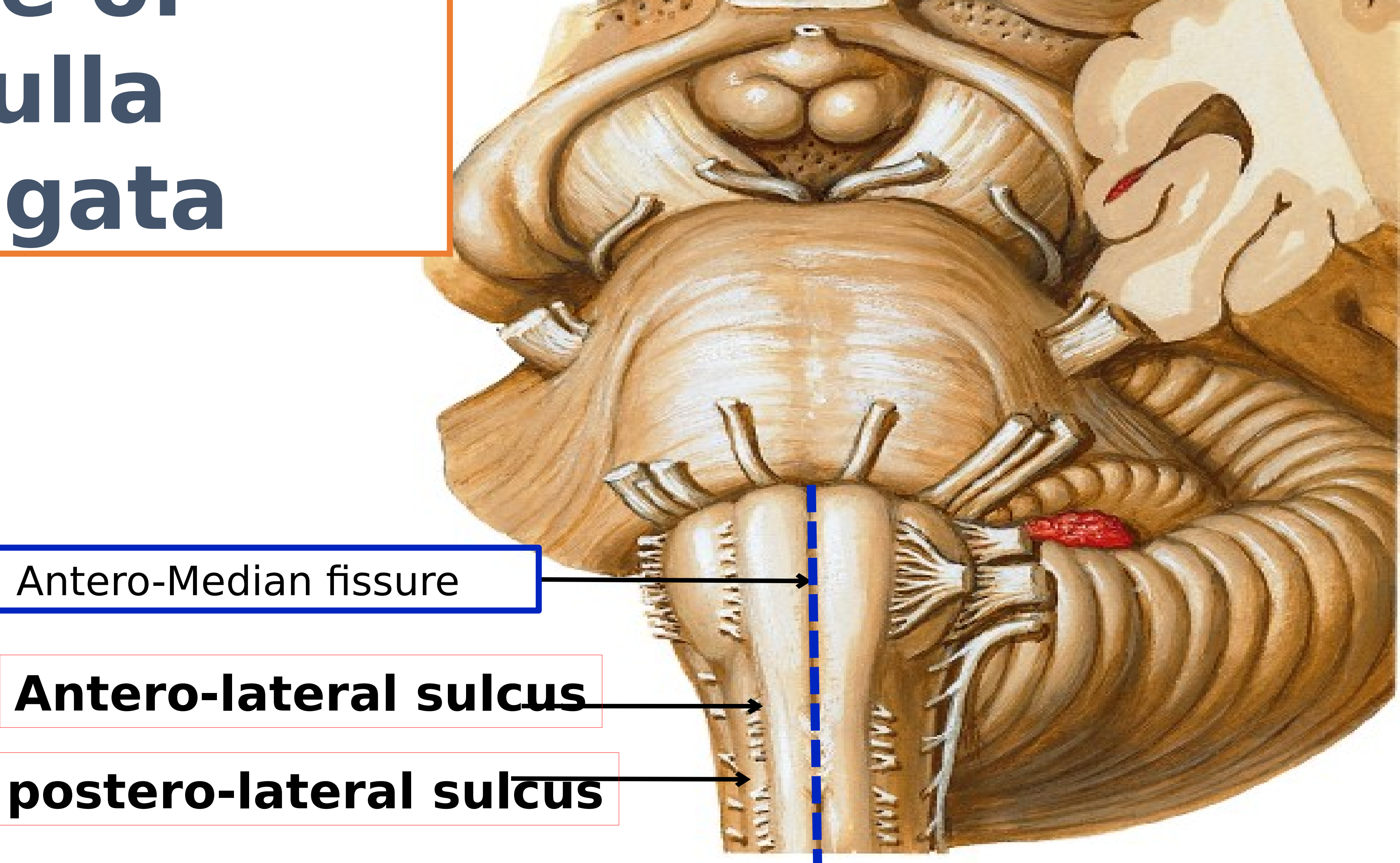




Posterior surface

Ventral Surface of Medulla Oblongata

Ventral (Anterior) surface of Medulla Oblongata



Medulla Oblongata

Ventral (Anterior) surface of Medulla Oblongata

Pyramid

Olive

Inferior Cerebellar Peduncle

Medulla Oblongata

Posterior Surface of Medulla Oblongata

Posterior Surface of Medulla Oblongata

A-closed medulla:

Cuneate Tubercle & Cuneate Ridge

Gracile Tubercle & Gracile Ridge

T

R



erior cerebellar peduncle(ICP).

Ope
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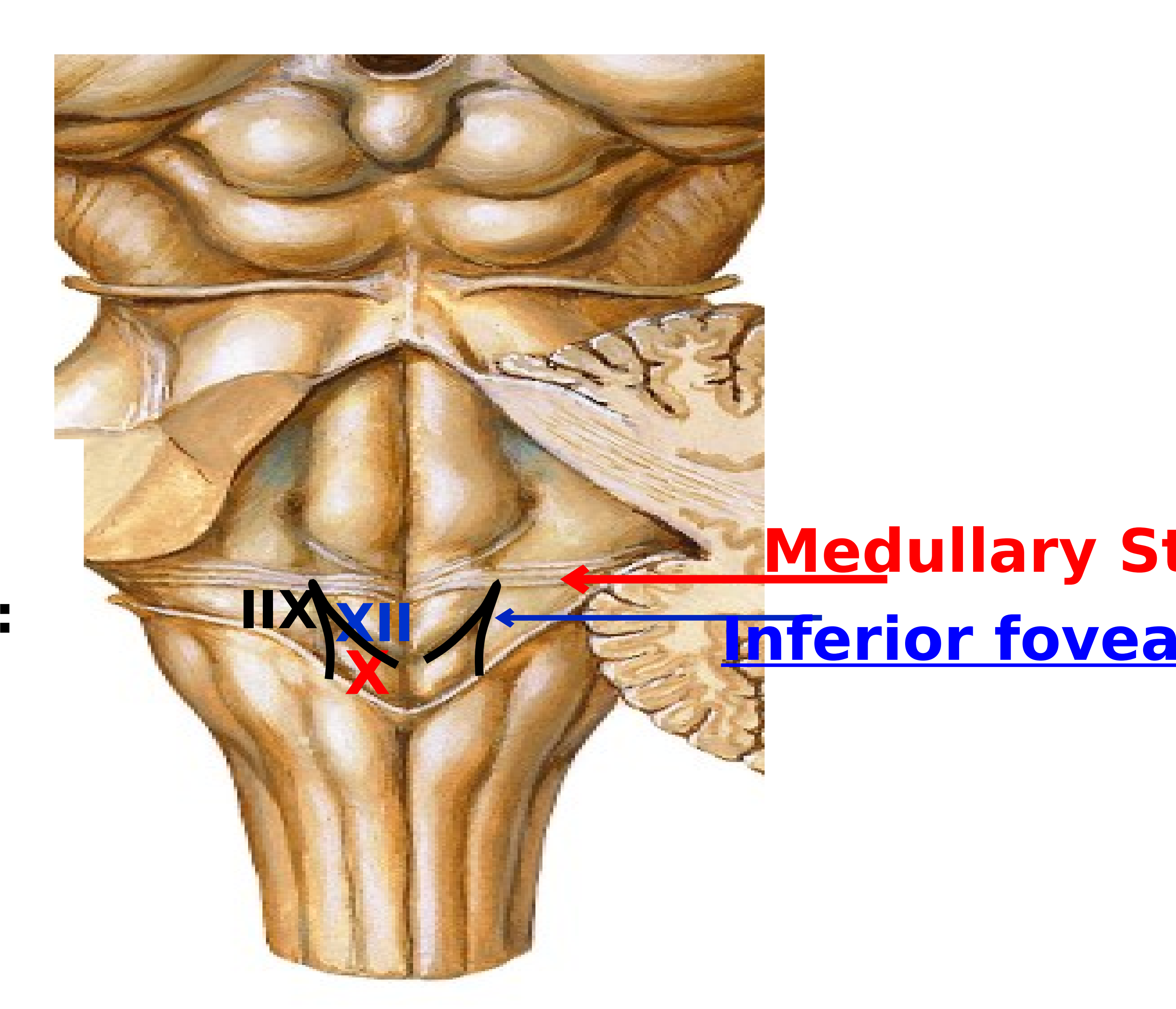
Clos
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Posterior Surface of Medulla Oblongata

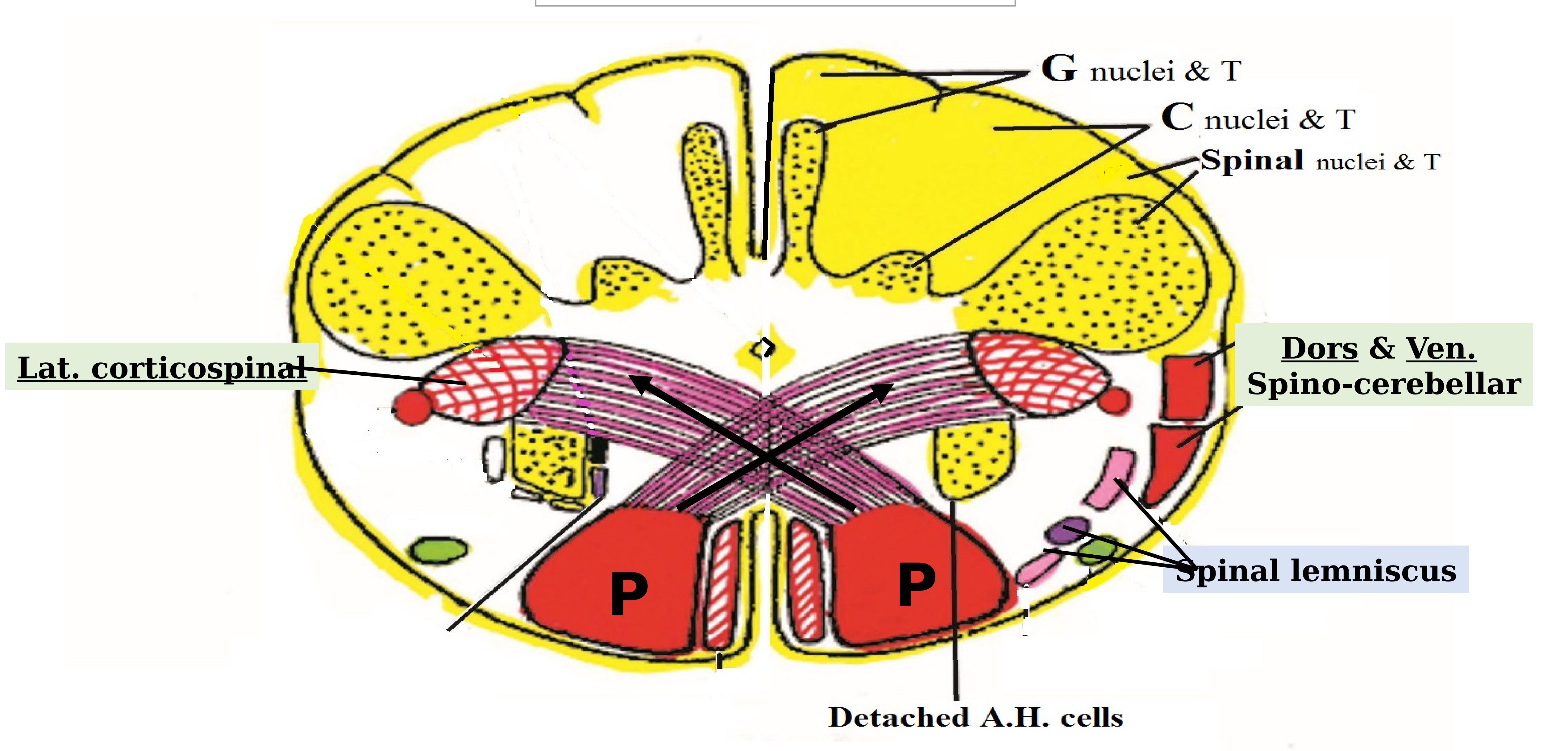
- **medullary stria (horizontal fibers)**
- **Depressed sulcus : Inferior fovea**

an inverted V-shaped depression.

- **3 areas = trigone :**



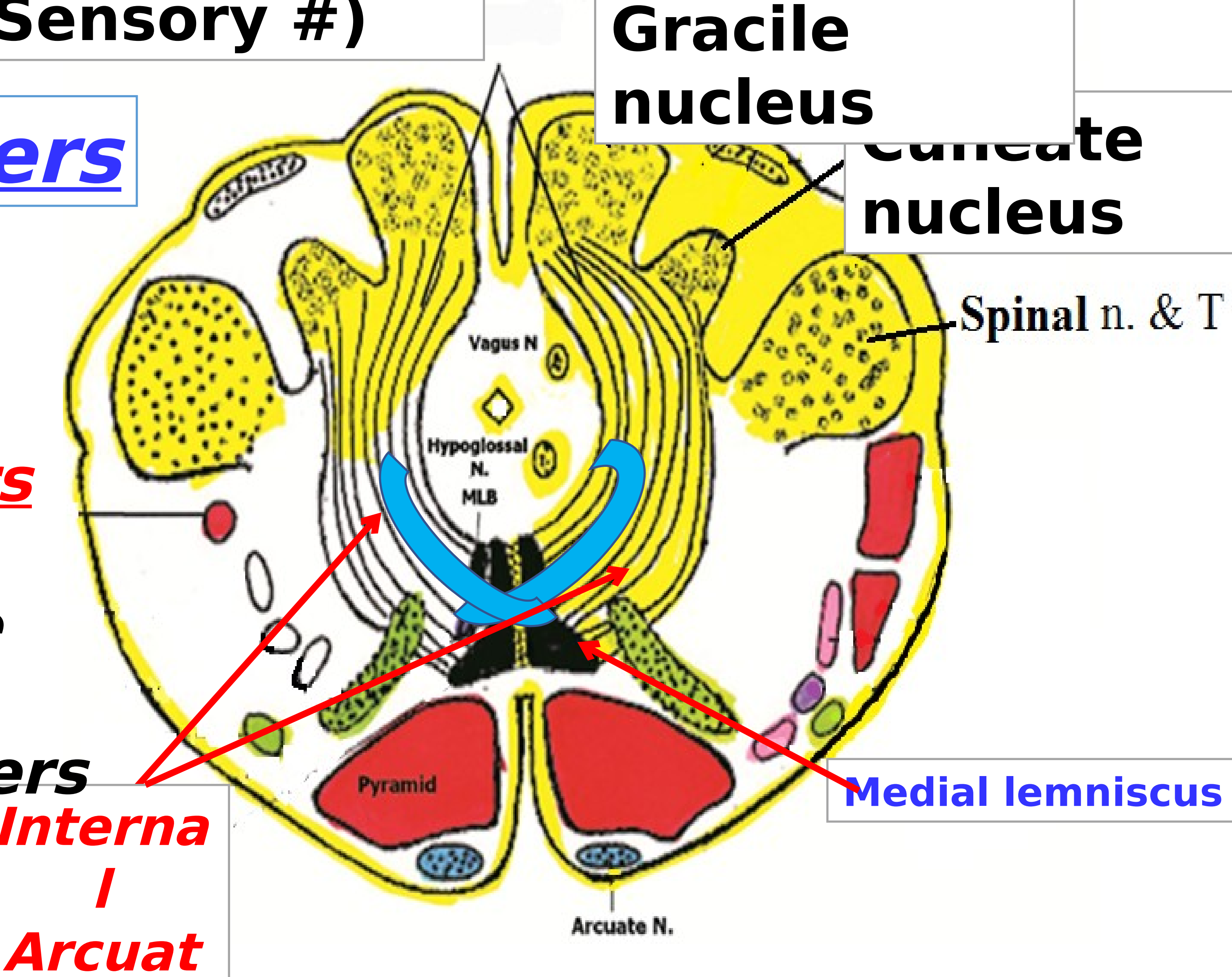
Closed Medulla
(Motor #)



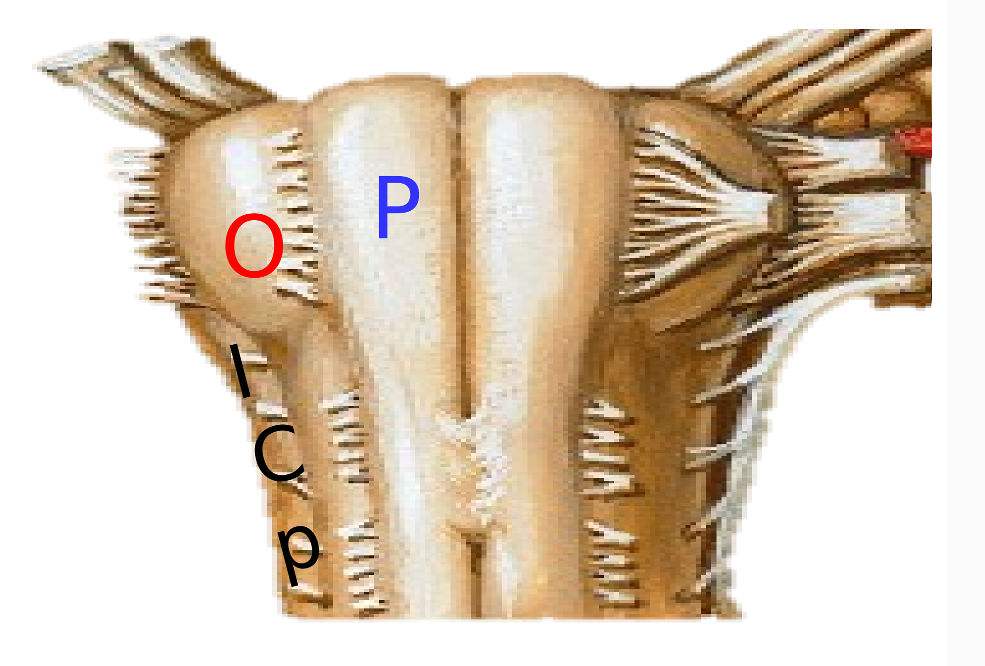
Closed Medulla (Sensory #)

Internal arcuate fibers

- ***Axons of gracile and cuneate nuclei curve anteriorly forming internal arcuate fibers***
- ***Decussate with the fibers of the opposite side***
- ***After decussation fibers ascend as the medial lemniscus***



Open Medulla (ventral surface)



Transverse section

M.L
M.T
M.L

ICP

O

P

Vent. Spino-cerebellar

Spinal lemniscus

Spino-olivary tract



T.S. Open Medulla

OLIVARY NUCLEI (3 in number)

1. **Inferior** Olivary nucleus
2. **Dorsal Accessory** Olivary nucleus
3. **Medial Accessory** Olivary nucleus

Dorsal Accessory

Inferior olivary

Medial Accessory

❑ Olivary complex

➡ *proprioception to cerebellum*

➢ ***Inferior olive:***

It is the largest, lies in the open medulla & appears corrugated with its hilus facing dorso-medially.

Function:

- Receive ***Spino-olivary tract***
- Sends ***olivo-cerebellar fibers*** (cross & pass via the ICP).

Spinal cord ----->inferior olive ---->

➢ ***Dorsal & medial accessory olives:***

Send proprioceptive fibers to cerebellum

Dorsal Accessory

Inferior olivary

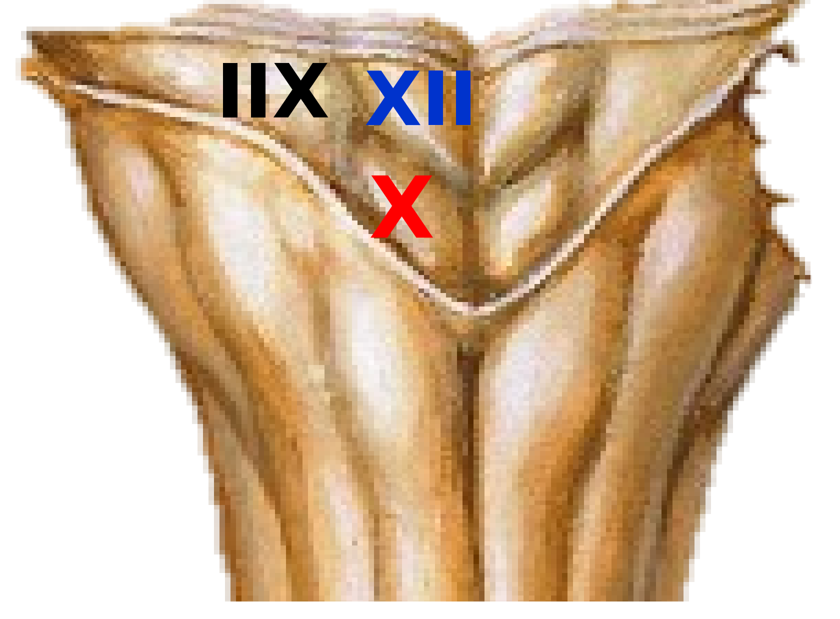
Medial Accessory

Olivo-cerebellar fibers

Spino-olivary tract

Open Medulla
(Dorsal surface)





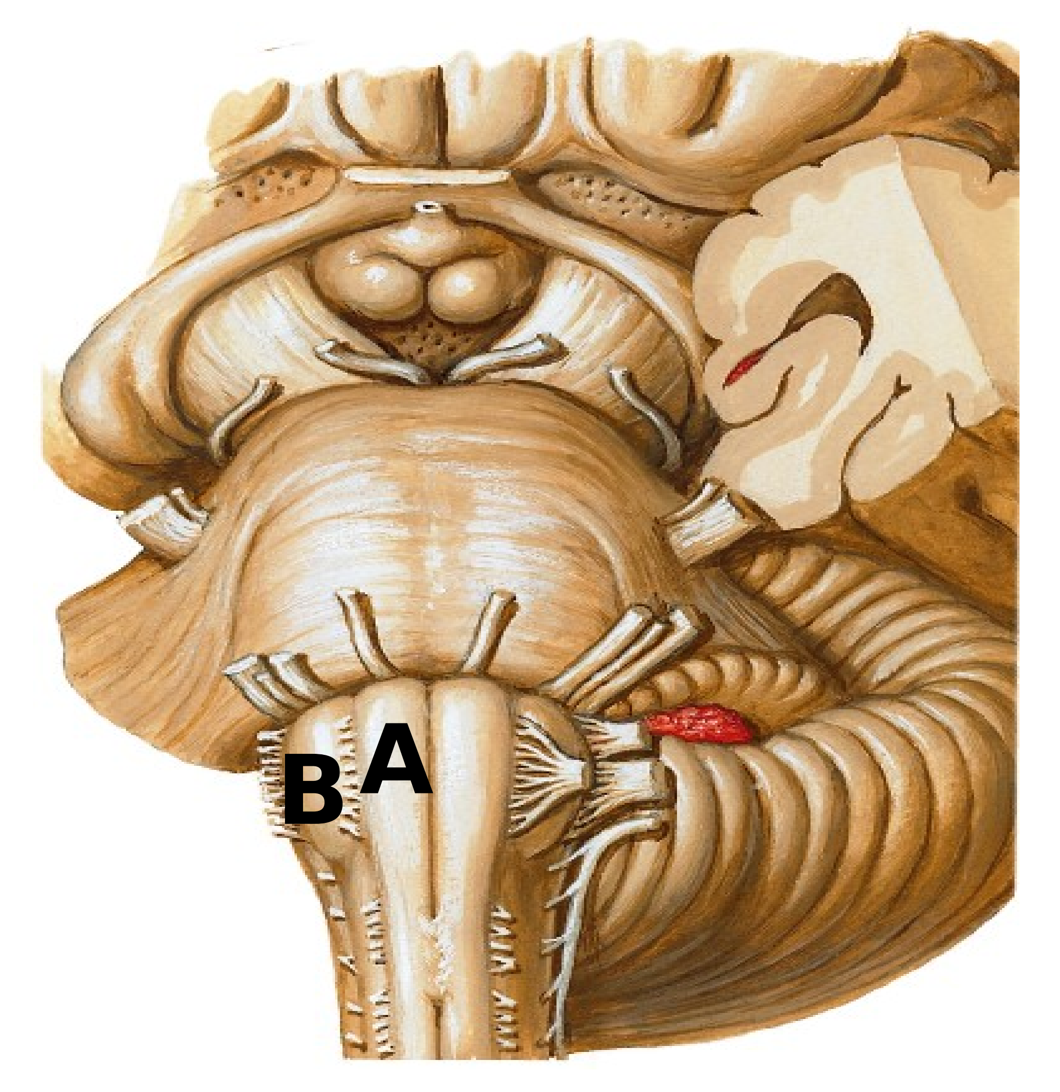
IIX X XII

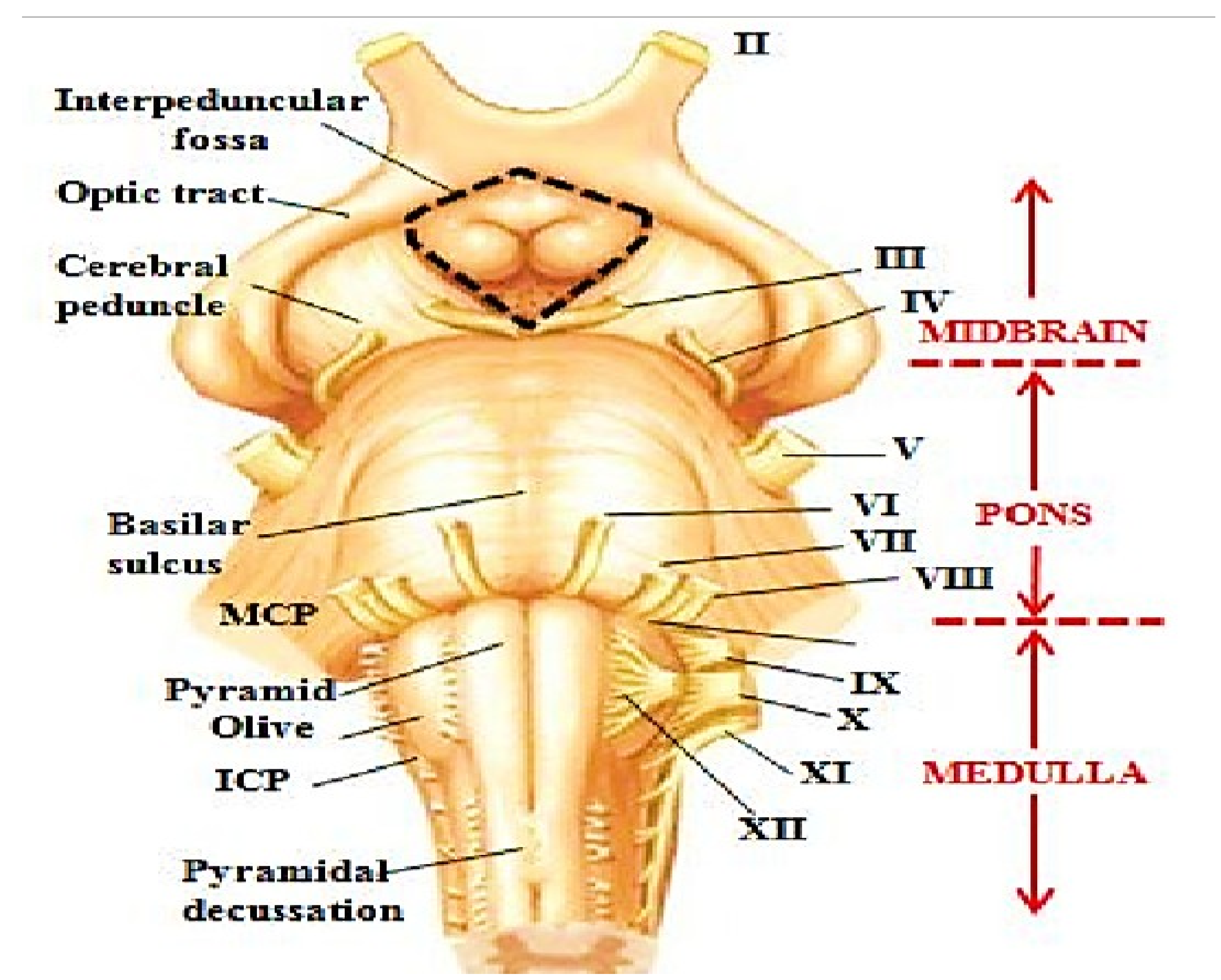
1. **Hypoglossal Trigone**: overlies hypoglossal nucleus.
2. **Vagal Trigone:** overlies dorsal vagal nucleus

Lecture Quiz



Which of the following structure if injured there will be hemiplegia ?



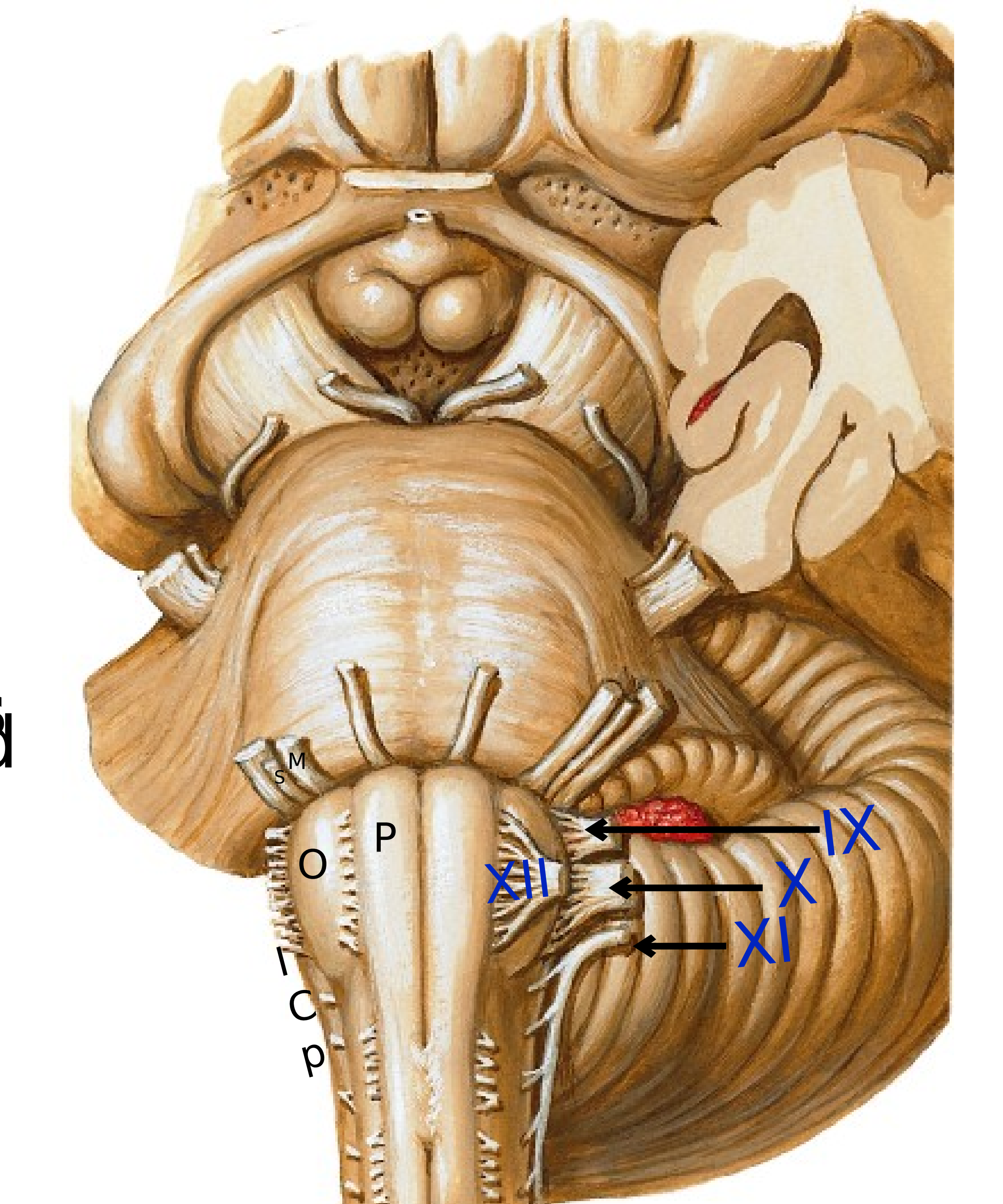

II
Interpeduncular fossa
Optic tract
Cerebral peduncle
III
IV
MIDBRAIN
V
PONS
Basilar sulcus
VI
VII
VIII
MCP
IX
X
Pyramid
Olive
ICP
XI
MEDULLA
XII
Pyramidal decussation

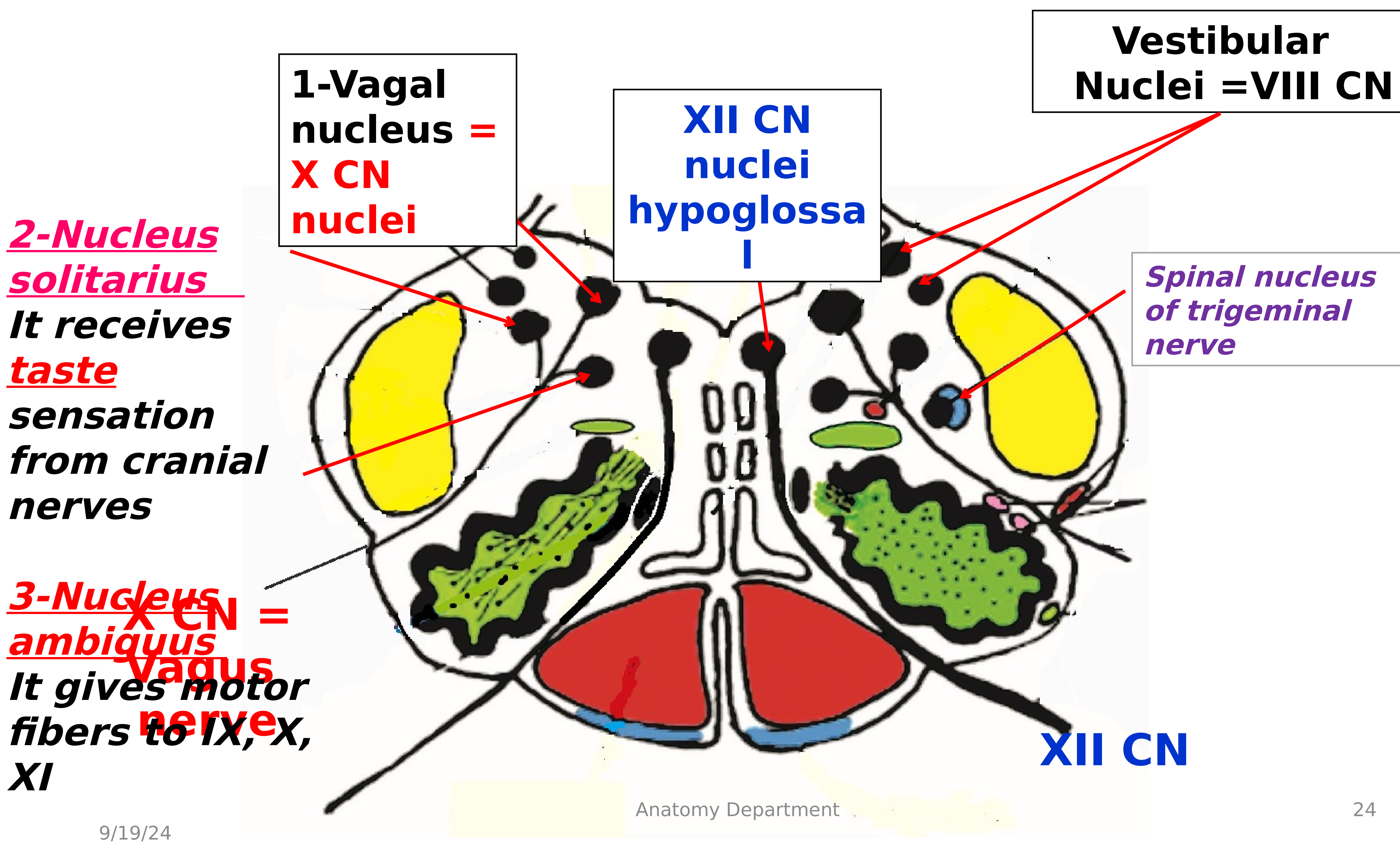
- **Glossopharyngeal (9th)**
- **Vagus (10th)**
- **Acessesory (11th) nerves**

exit between olive and ICP

- **Hypoglossal (12 th) nerve**

exit between pyramid and olive



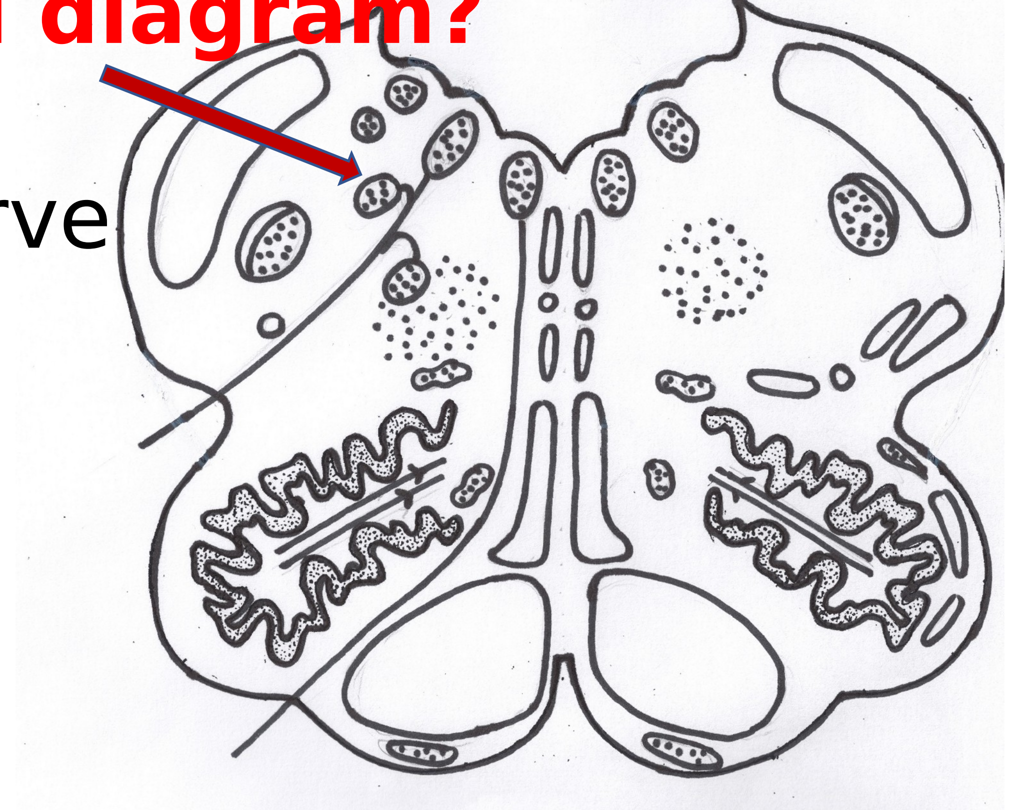

1-Vagal nucleus = X CN nuclei
XII CN nuclei hypoglossal
Vestibular Nuclei =VIII CN
2-Nucleus solitarius
It receives taste sensation from cranial nerves
Spinal nucleus of trigeminal nerve
3-Nucleus ambiguus
It gives motor fibers to IX, X, XI
X CN = Vagus nerve
XII CN

Lecture Quiz



- **Which of the following structure is indicated by the arrow in the provided diagram?**

1. Spinal nucleus of trigeminal nerve
2. Hypoglossal nucleus
3. Dorsal motor nucleus of vagus
4. Medial vestibular nucleus
5. Nucleus solitaires



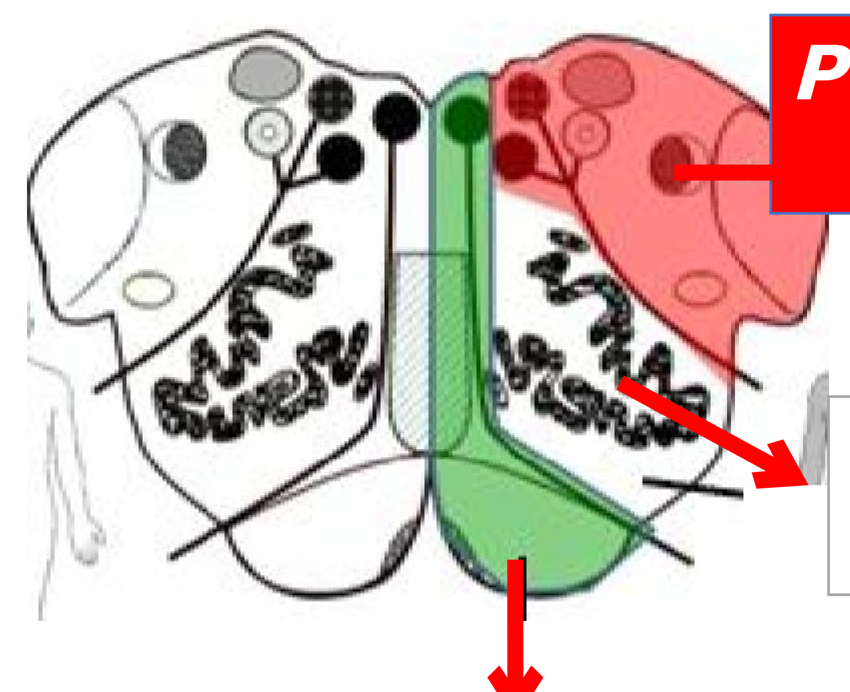
Lecture Quiz



- **Which of the following statement is correct concerning a transverse section through the superior level of medulla?**

1. The pyramids taper posteriorly and give rise to decussation of the pyramids.
2. The inferior olive receives corticospinal fibers.
3. The vagus nerve emerges between olive and inferior cerebellar peduncle.
4. Hypoglossal nucleus represents lateral trigon in the floor of 4th ventricle.
5. The medial lemniscus is formed by the anterior spinothalamic and spinotectal tracts.

Blood supply of the medulla



Posterior inferior cerebellar ar
(PICA):

supplies **lateral part** of MO.

Medullary branches of vertebral artery

olive).

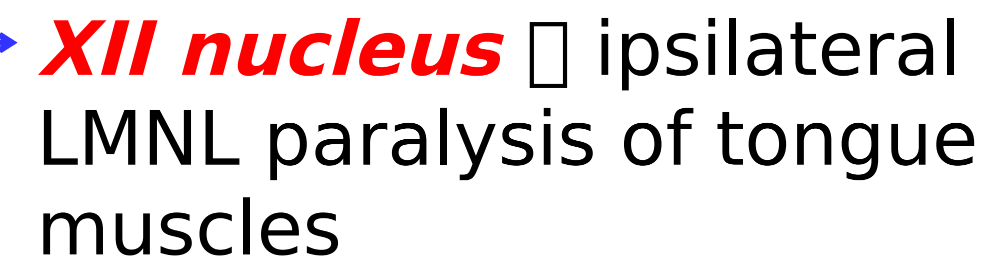
Anterior spinal artery

supplies the part **medial to hypoglossal nerve** (containing XII nucleus, medial lemniscus& pyramid).

Anterior spinal artery oclussion



Medial medullary syndrome



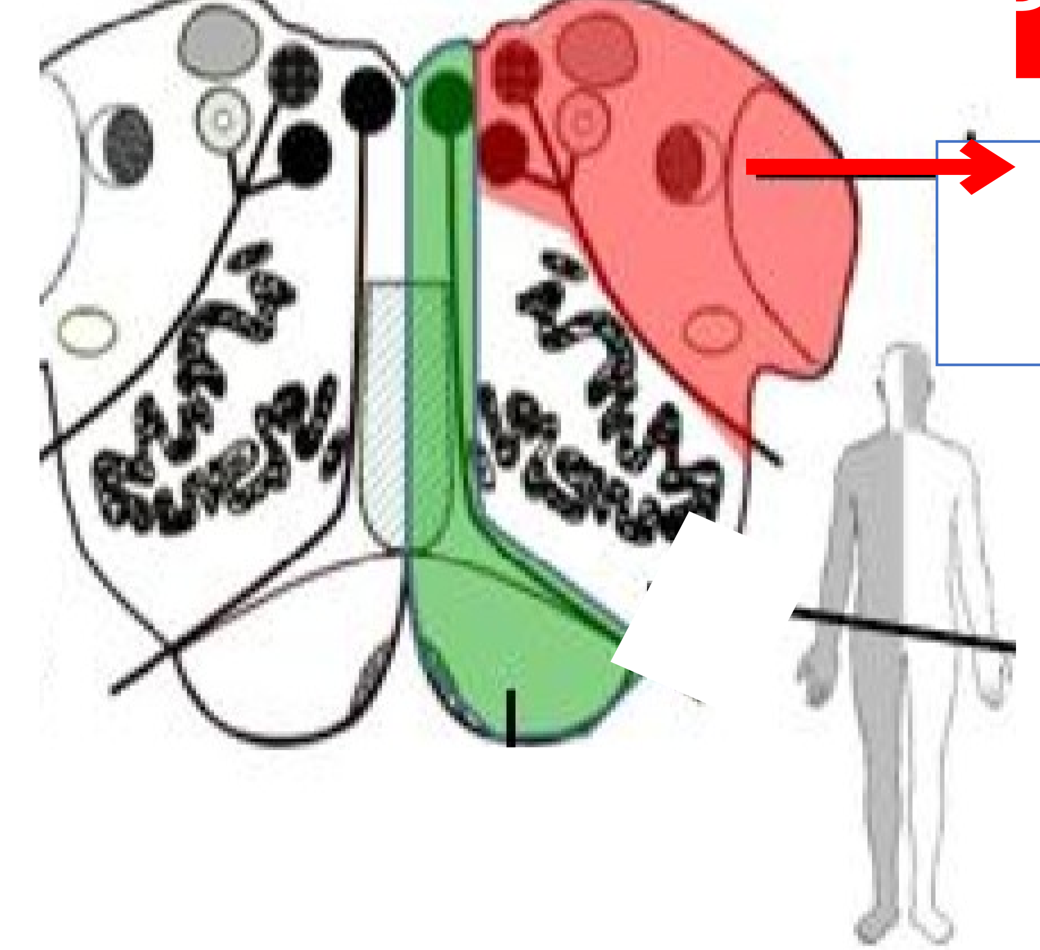
XII nucleus ipsilateral LMNL paralysis of tongue muscles

Medial lemniscus contralateral loss of proprioception & fine touch

Pyramid contralateral hemiplegia



PICA occlusion



lateral medullary syndrome

cerebellar ataxia.

b. Spinal Nucleus of V ipsilateral loss of pain & temp. from face.
c. Spinal lemniscus contralateral loss of pain & temp. from body.
d. Nucleus ambiguus ipsilateral paralysis of palate, pharynx, larynx.
e. Nucleus solitarius loss of taste sensation.

Lecture Quiz



- **Lateral medullary syndrome affects which of the following internal structure of the medulla?**

1. The pyramids.
2. The inferior olive.
3. Inferior cerebellar peduncle.
4. Medial lemniscus.
5. Hypoglossal nucleus.